

***Model Driven  
Multi-Protocol Embedded Agent***

***OMG Workshop on Embedded & Real-Time  
Distributed Object Systems***

***Case Studies Session***

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***9:15 AM***

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# *Topics*

- **Model Driven Architecture (MDA).**
- **Application Services.**
- **Examples of Services.**
- **Multi-Protocol Embedded Agent Development Process.**



***Model Driven  
Architecture***

# ***Model Driven Architecture***

- **An OMG initiative to solve integration of various Technologies.**
- **Technology, Vendor, middleware, language neutral.**
- **Technology specific information is expressed through model transformation rules.**
- **Based on OMG standards already established.**

# ***Model Driven Architecture...Contd.***

- **ITU defined Guidelines for the Definition of Managed Objects (GDMO):**
  - **Syntax for defining information (X.722).**
  - **Object Oriented.**
  - **Extension of Abstract Syntax Notation One (ASN.1) used to define other OSI services (X.208).**
  - **Contains templates to define objects, attributes, reports generated by objects and services offered by objects.**
  
- **IETF defined SNMP as protocol between Agent and Manager for managing data devices:**
  - **IETF RFC 1155, 1157, 1213 etc. define SNMP MIBs.**
  - **SNMP MIBs are also defined using ASN.1.**
  - **Information is structured as a tree similar to GDMO.**

# *Model Driven Architecture...Contd.*

- **UML**
  - Used for graphical representation of application objects.
  - Provides constructs (graphic templates) for definition of classes, inheritance, associations etc.
  - Provides stereo-typing for application specific extensions to UML.
  - OMG UML provides a powerful data modeling framework over CORBA.
  - Standard translation algorithms to translate GDMO & SNMP to IDL.



***Services***

# Services

- **A service is:**
  - An application module providing a specific functionality to a telecommunication **Business Services** such as (Configuration/Provisioning, SLA ) and any **Framework Services** such as ( Notification, Logging, Naming, Policy, Security, etc ).
  - An independent entity which can be started, shutdown and/or having relationship with other services.
- **A service contains a contract for:**
  - A very specific set of requirements.
  - A model representing the requirements (Data, Operations and Behavior).
  - An implementation of the model.



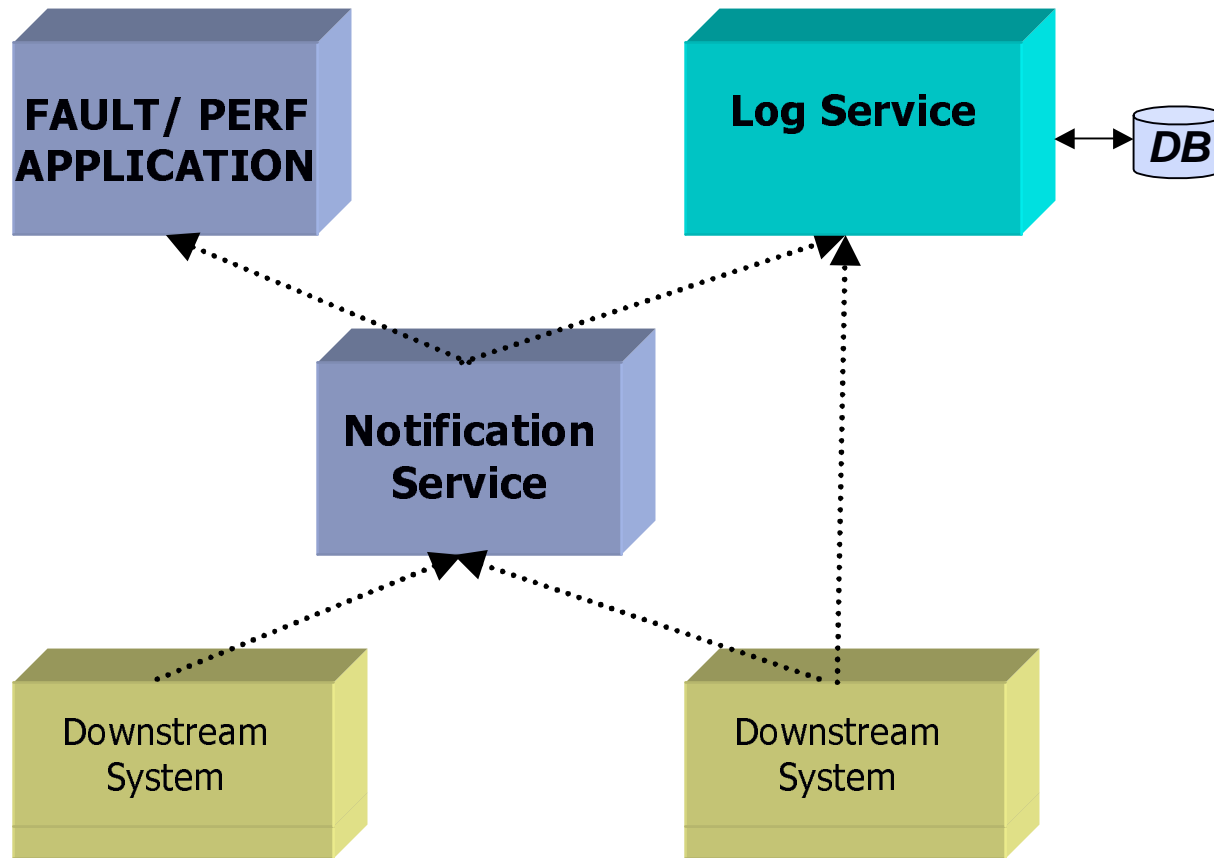
## ***Services ...Contd.***

- **A programming interface to the access, customize and extend the functionality of the service.**
- **An external interface to provision the service (e.g., Create User).**
- **A presentation (GUI, Web based or stand alone) to provision and access the functionality offered by the service.**

# ***Log Service***

- **Log service provides filtering criteria based logging of events. Messages are logged to persistent storage.**
- **Log service provides retrieval of logged records.**
- **Log service provides policy for purging of logged records.**
- **Log service can be a consumer to the Notification service.**
- **Log service must be conformant to Telecom Log Service.**

# Relationships

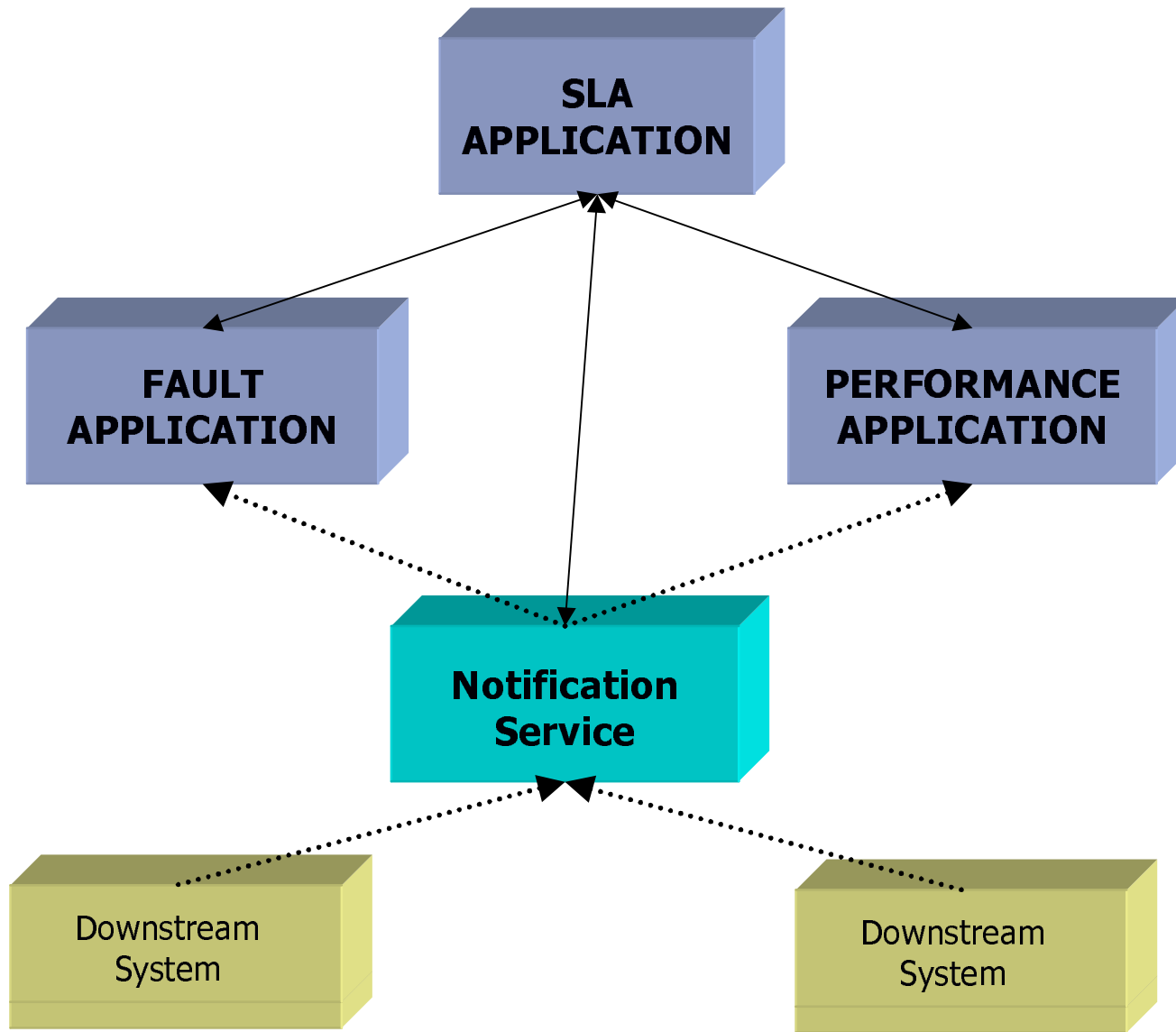


# ***Notification Service***

- **Notification service facilitates the publish/subscribe messaging.**
- **Suppliers connect to the notification service to supply events.**
- **Consumers connect to the notification service to obtain events.**
- **Suppliers use the notification service to send autonomous messages to registered consumers – these messages are alarm messages, performance reports or events occurring in a particular system.**
- **Notification service may support QOS on connection-reliability and event-reliability.**



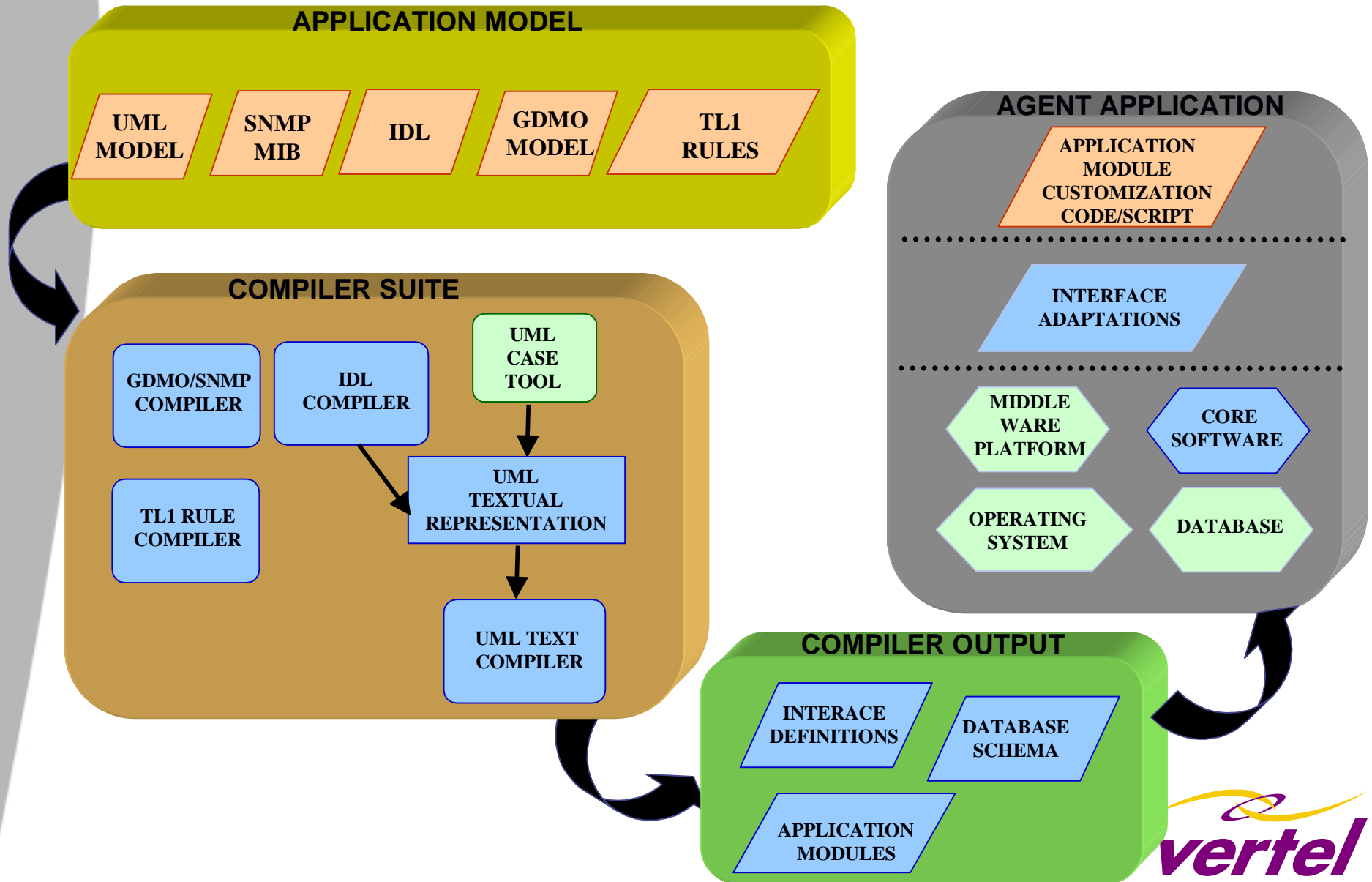
# Relationships



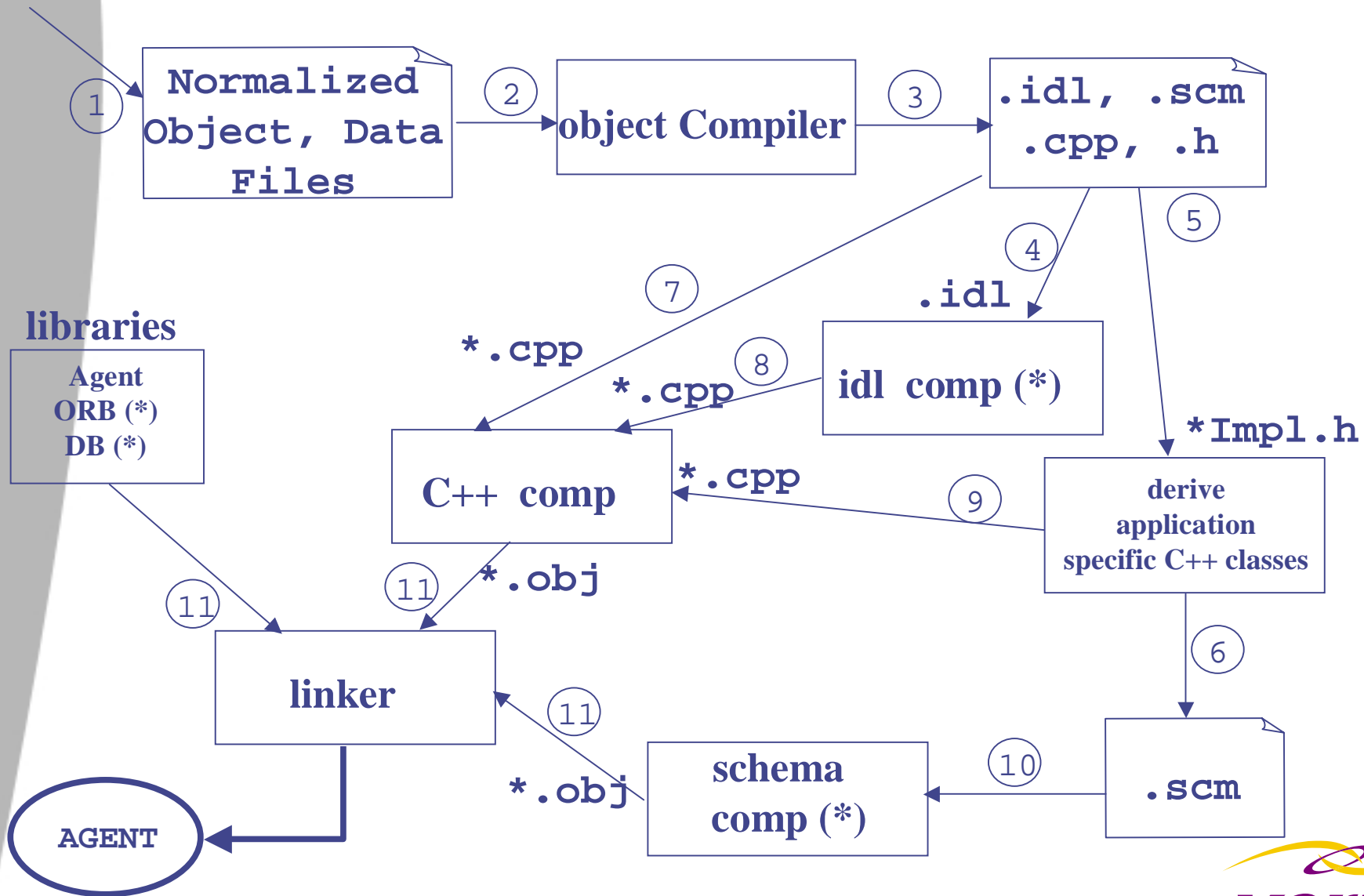


***Multi-Protocol  
Agent Development  
Process***

# APPLICATION MODELING & DEVELOPMENT



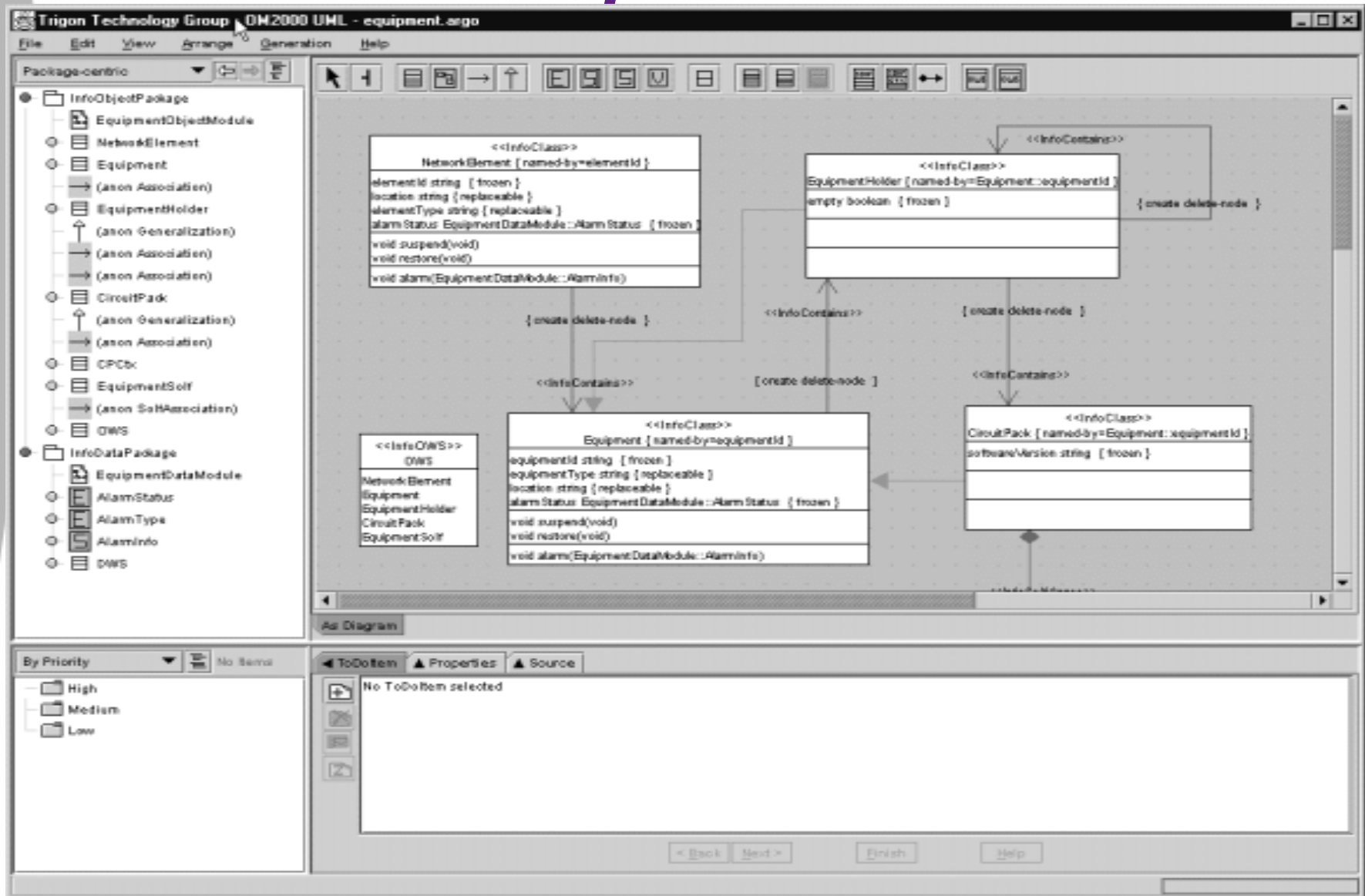
# Application Development Process



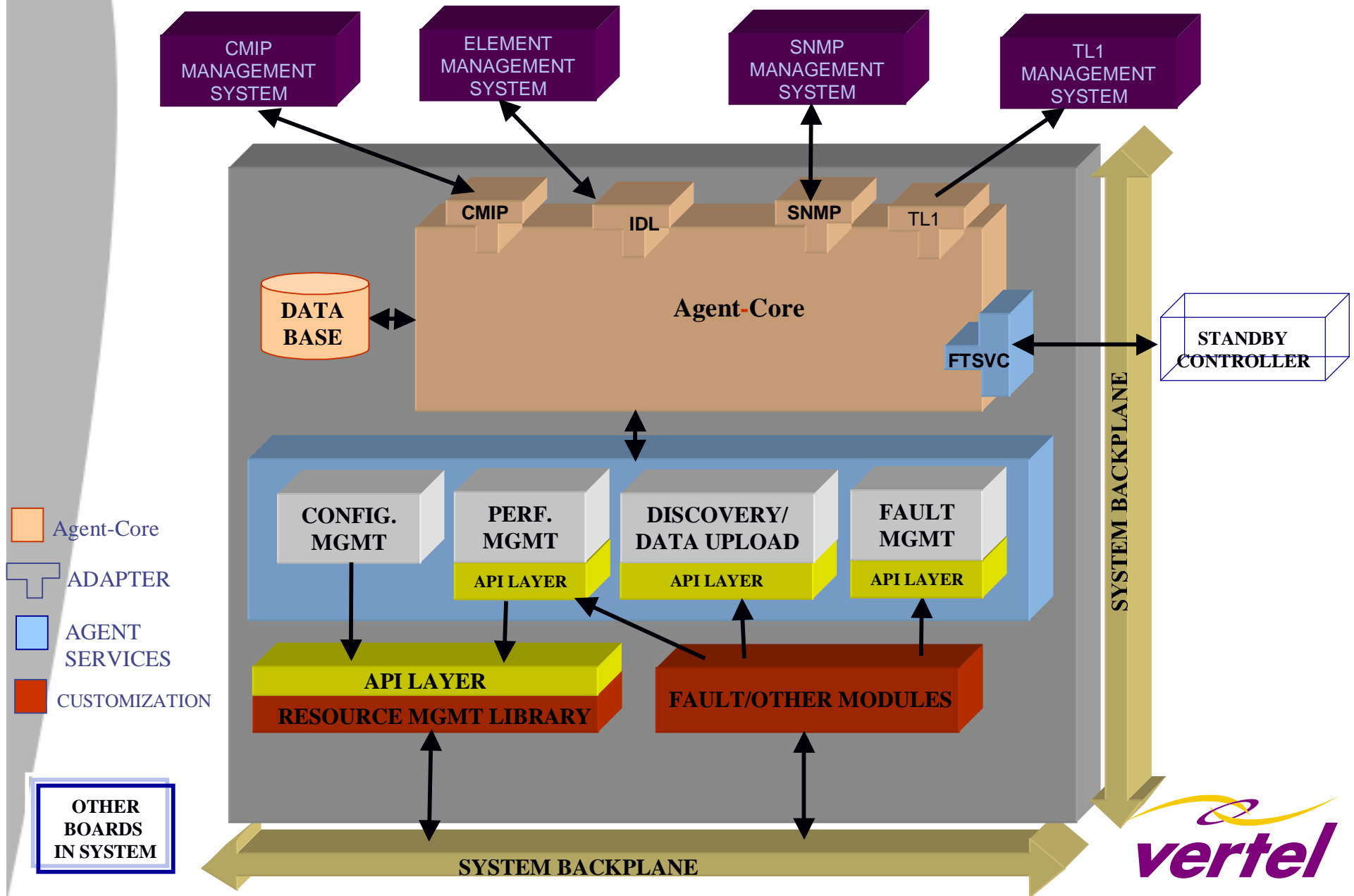
(\*) Third Party Software



# An Example - UML Model



# Multi-protocol Agent



# ***Conclusion***

- **Powerful information model to design and implement application components modeled in various standards such as GDMO, SNMP, UML, TL1 rules.**
- **A shared normalized information application model to expose various protocol interfaces dynamically.**
- **Ease of adding additional services such as Log, Notification and other FCAP Services.**
- **Provides maximum automation in application logic development for back-end interface with system back plane.**
- **High Performance Transaction oriented embedded agent core with persistent interface to database**

